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A ROCK DRILLING METHOD

The present invention concerns a rock drilling method, and more precisely a method of extracting ore from an ore-bearing rock where the ore is present in a layer extending through said rock and having an at least approximately defined thickness in a plane extending across said layer.

In certain ore-fields, particularly such containing precious metals, e.g., gold and platinum, the ore-bearing formation has such limited dimensions that normal ore mining is uneconomical. One example of such formation is a gold deposit in South Africa, where the auriferous body has a relatively small thickness, but relatively large longitudinal and lateral extensions, whereas surrounding rock has little or no gold occurrence. Since even the auriferous body itself has a low gold content, it would be extremely uneconomical to win gold from such deposit using normal ore mining procedures involving drilling, blasting, crushing and concentration, since the yield would in no way correspond to the costs and efforts involved.

Today's method of extracting ore from limited ore bodies involves drilling with hand-held rock drills in long tunnels, where the operator lies down on his back feeding the rock drill with his feet. Evidently, this working method is inconsistent with modern working environment policies.

The present invention aims at enabling economical mining also in cases where an ore-body has dimensions making normal mining methods not practicable, particularly in cases, where the ore is present in a relatively thin layer having an at least approximately defined thickness, and where the layer has

relatively large longitudinal and lateral dimensions in relation to its thickness.

According to the present invention it is proposed, thus, to provide a drill having a diameter substantially equal to the thickness of the ore-body. With the drill, a first hole is drilled in the ore-body, preferably along an axis extending along a mid-plane of the layer. Then, a second hole is drilled with the drill in the ore-body adjacent the first hole along an axis spaced from the axis of the first hole a distance less than the diameter of the drill. In this way, the two holes intersect or overlap one another, providing a continuous hole having the approximate shape of the digit eight [8]. Depending on the spacing between the hole axes, more or less of metalliferous ore is left in exterior regions of the layer, where the holes do not intersect. Depending on the lateral dimension of the ore-body, further holes are drilled adjacent the second hole, the third hole etc.

The drill cuttings yielded may be continuously collected during the drilling of each hole.

Depending on the longitudinal and lateral extensions and directions of the ore-body, an axis of a hole may be parallel to or not parallel to an adjacent hole.

Preferably, drilling takes place from a first drift where the ore-body is localized, so that the holes may be started at proper positions in the ore-body. Suitably, each hole terminates in an adjacent, second drift at a distance from the first drift corresponding to available or practicable drill lengths. Then, a further set of intersecting holes may be drilled from the second drift.

The method according to the present invention will be described more in detail hereinafter, reference being made to the accompanying drawings, wherein:

Fig. 1 is a section through a drift extending through a rock and having a drilling machine therein drilling a series of intersecting holes;

Fig. 2 is a section through a hole drilled between adjacent drifts; and

Fig. 3 is a side view of the drilling machine.

In the drawings, 10 is a rock having a relatively thin ore-bearing formation 11 extending therethrough. The extension and approximate thickness of the ore-bearing formation has been determined by drilling from the surface of the ground above the formation. A drift 12 has been made through the rock so as to have the ore-bearing formation 11 extending therealong. The extension (in one direction) and approximate thickness t of the ore-bearing formation determined is indicated in Figs. 1 and 3 by two spaced dashed lines extending along the drift.

As seen in Figs. 2 and 3, the ore-bearing formation 11 is shown to be inclined.

According to the present invention, a drill 13 having a diameter d substantially corresponding to the approximate thickness t of the ore-bearing layer 11 determined is used to drill a first hole H_1 along an axis A_1 extending along an approximate mid-plane M of the layer 11 (Fig. 1).

Due to practically limited drill lengths, and the relative uncertainty as to the accuracy in following the true extension of an ore-bearing layer, it is suitable to have several spaced

drifts 12a, 12B extending through the rock and to drill from one drift towards another as shown in Fig. 2.

After completion of the first hole H_1, a second hole H_2 is drilled along a second axis A_2 also extending along the approximate mid-plane of the ore-bearing layer 11. The axes A_1 and A_2 are parallel if the layer is a 'plane' layer, but they may as well be non-parallel if the layer is curved. The spacing *s* between the axes A_1 and A_2 is chosen such that the holes H_1 and H_2 intersect or overlap one another as shown in Fig. 1. In other words, the spacing *s* is less than the drill diameter *d*. Evidently, depending on the spacing chosen, more or less material is left unbroken in areas where two holes do not intersect.

The drill cuttings yielded are continuously collected.

In Figs. 2 and 3 the floor of the drift is shown to be substantially horizontal in the cross-wise direction of a machine 14 carrying the drill. It may be advantageous, however, to make the floor inclined, e.g. 10°, thereby achieving a reduced breaking of useless rock from the drift bottom. For instance, in Fig. 3, inclining the floor by raising the lower left end thereof would leave a triangular cross-section of rock at the drift bottom.

CLAIMS

1. A method of extracting ore from an ore-bearing rock (10) where the ore is present in a layer (11) extending through said rock and having an at least approximately defined thickness (t) in a plane extending across said layer, characterized by the steps of:

a) providing a drill having a diameter (d) substantially corresponding to said approximately defined thickness (t);

b) drilling with said drill through at least a portion of said layer (11) a first hole (H_1) along a first axis (A_1) located in a plane substantially perpendicular to said plane;

c) drilling with said drill at least a second hole (H_2) adjacent said first hole (H_1) along a second axis (A_2) spaced from said first axis (A_1) less than said diameter(d); etc.

2. The method according to claim 1, characterized in that the drill cuttings yielded are continuously collected.

3. The method according to claim 1, characterized in that said first axis (A_1) and said second axis (A_2) are parallel.

ABSTRACT

A method of extracting ore from an ore-bearing rock (10) where the ore is present in a layer (11) extending through the rock and has an at least approximately defined thickness (t) in a plane extending across the layer. The method includes the steps of providing a drill having a diameter (d) substantially corresponding to said approximately defined thickness (t); drilling with the drill through at least a portion of the layer (11) a first hole (H_1) along a first axis (A_1) located in a plane substantially perpendicular to said plane; drilling with the drill at least a second hole (H_2) adjacent the first hole (H_1) along a second axis (A_2) spaced from the first axis (A_1) less than said diameter(d); etc.

Fig. 1

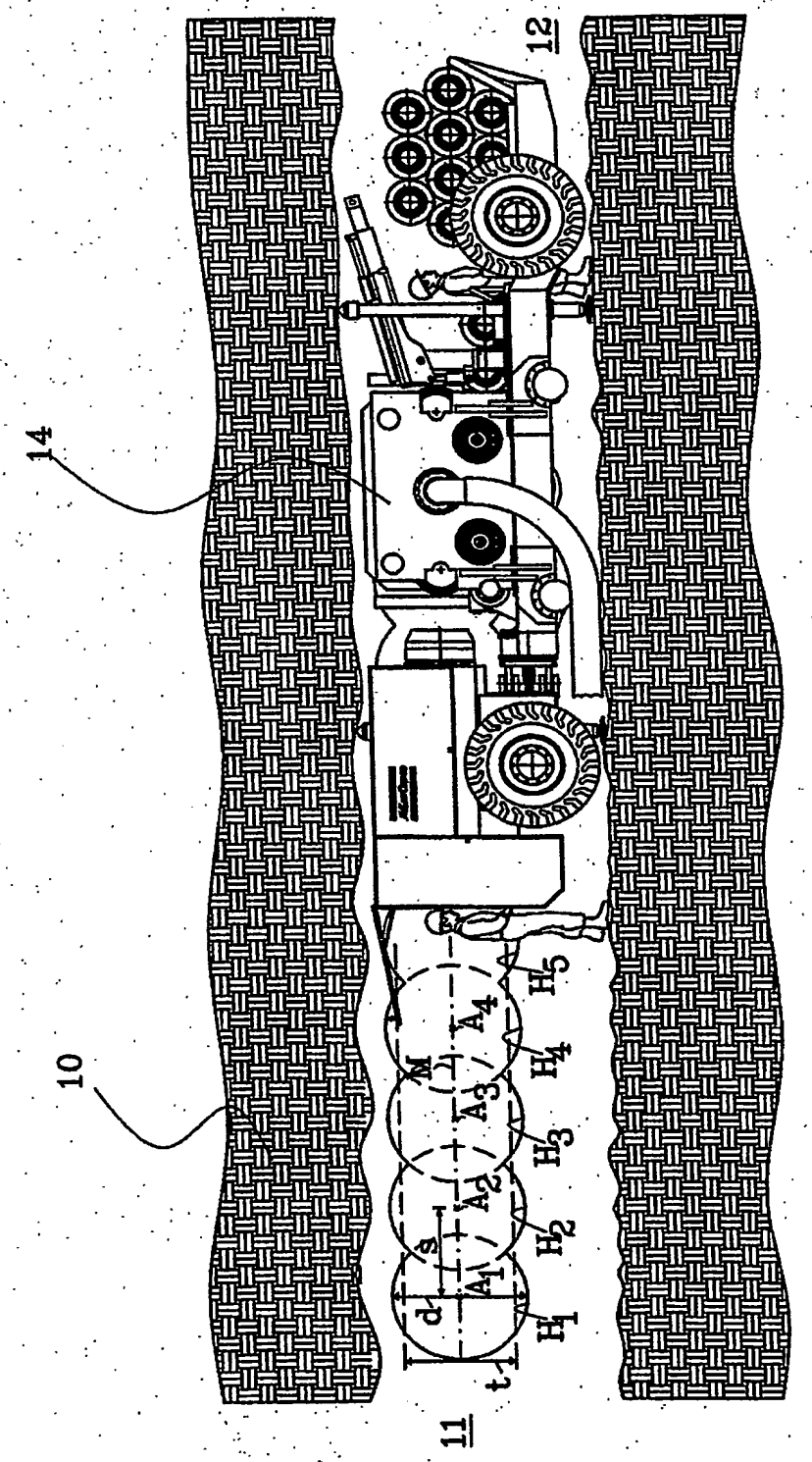

Fig. 1

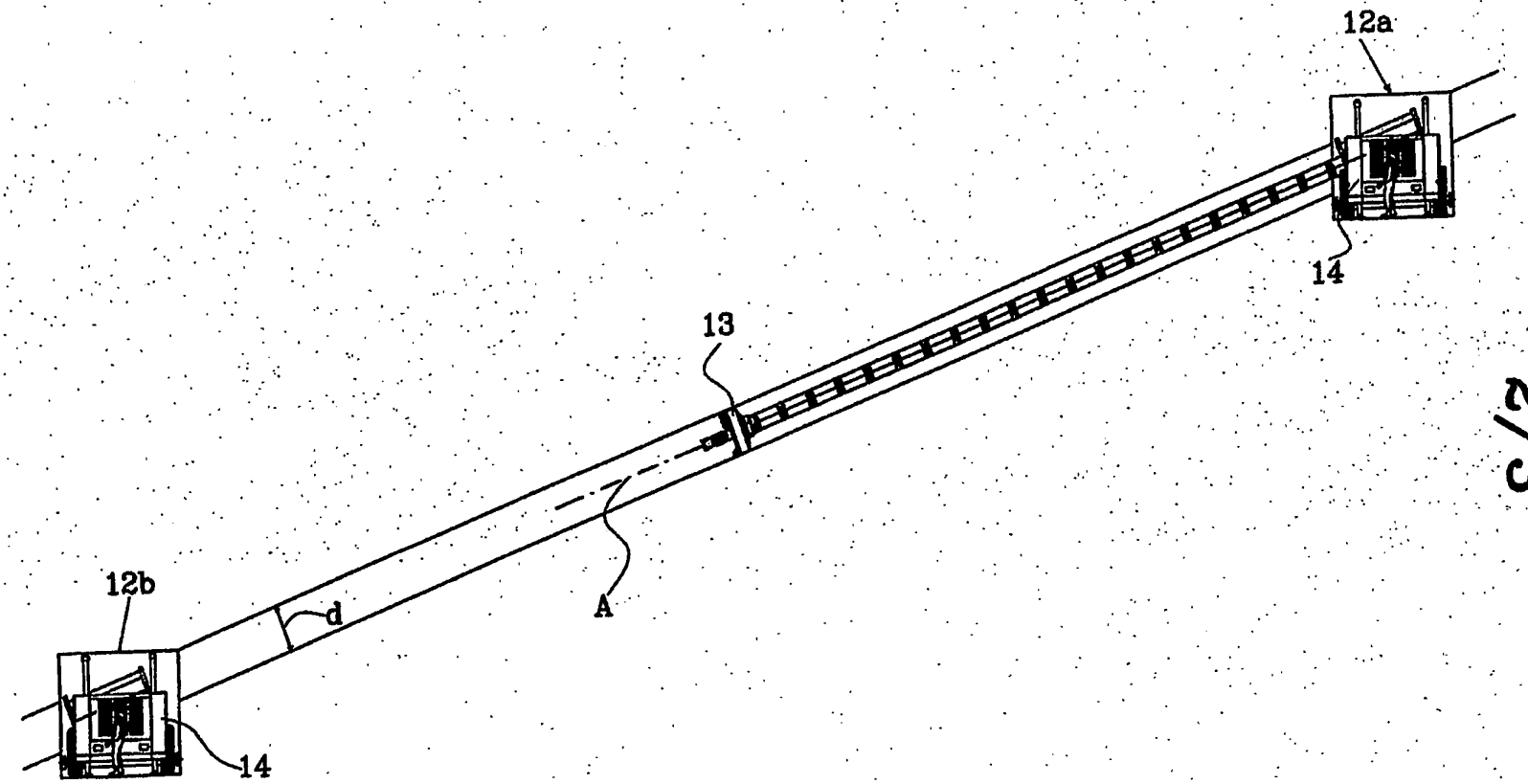

Fig. 2

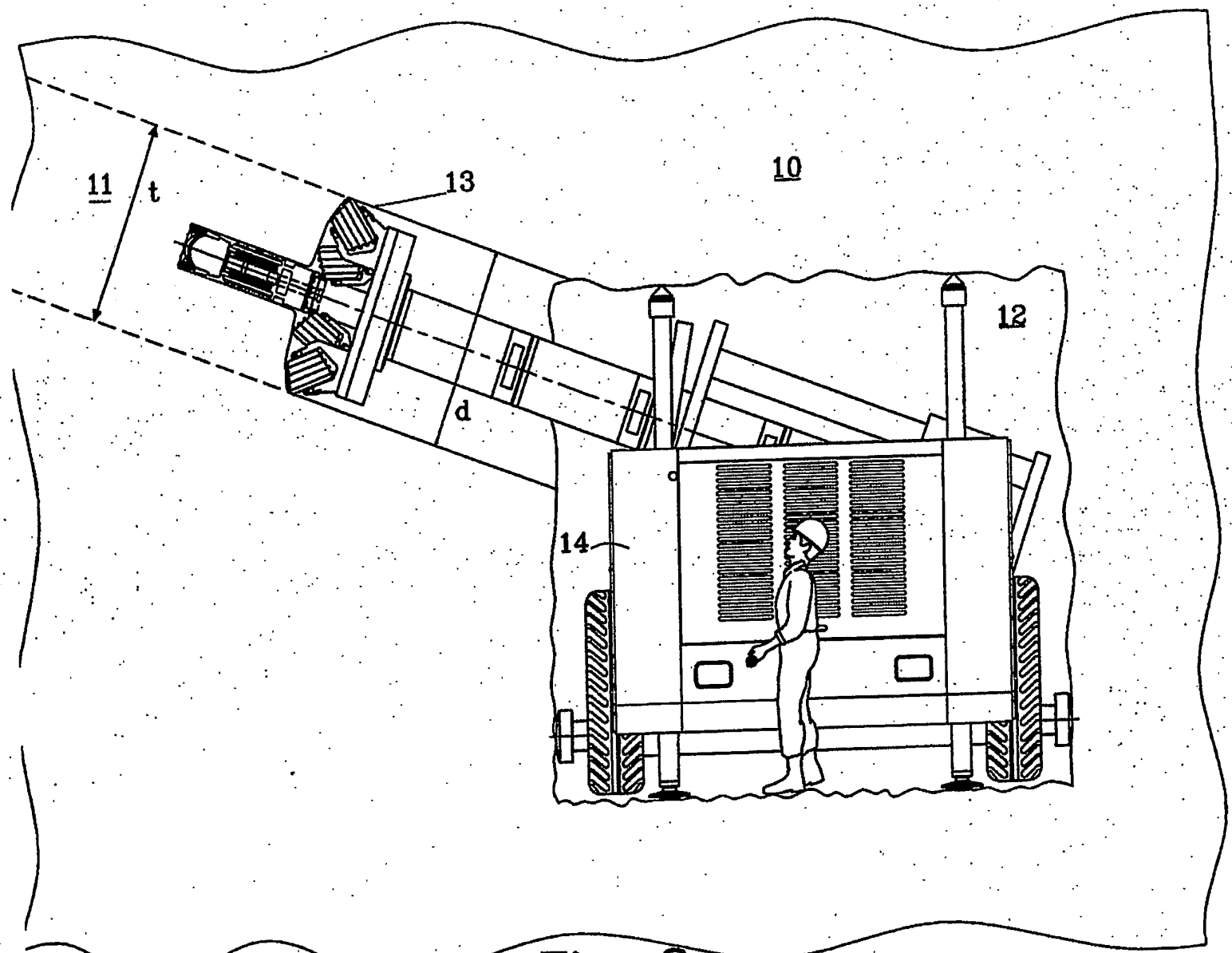

Fig. 3

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